ST. CLAIR TUNNEL, SARNIA PUMP HOUSE
Northeast of Sarnia (east) portal of the
St. Clair Tunnel
Port Huron
St. Clair County
Michigan

HAER No. MI-67-B

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
Northeast Region
U.S. Custom House
200 Chestnut Street
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HISTORIC AMERICAN ENGINEERING RECORD

ST. CLAIR TUNNEL, SARNIA PUMP HOUSE HAER No. MI-67-B

Location:	Northeast of the Sarnia (east) Portal of the St. Clair Tunnel, Port Huron, St. Clair County, Michigan UTM: 17.384900.4756940 Quad: Port Huron, MI, 1:24,000
Date of Construction:	1908
Engineer:	Grand Trunk Railway Engineering Department
Present Owner:	St. Clair Tunnel Company, 1333 Brewery Park Boulevard, Detroit, Michigan 48207-9998
Present Use:	Pumping station for the removal of surface runoff from the Sarnia approach to the St. Clair Tunnel.
Significance:	This pump house has served as a critical component of the drainage system built to prevent surface runoff from the 14-acre watershed created by the open-cut approach to the Sarnia (east) portal of the St. Clair Tunnel from entering into the tunnel proper. The pumping equipment in place today is of recent vintage and is the second generation of equipment to operate in this pump house.
Project Information:	This documentation is the result of a Memorandum of Agreement among the Michigan State Historic Preservation Office, the Advisory Council on Historic Preservation, the Department of the Army, Corps of Engineers, Detroit District and the Canadian National North America Railroad as a mitigative measure before the closing of the tunnel. It was completed in June 1993 by Charles K. Hyde, Wayne State University, Detroit, Michigan 48202

Note: For shelving purposes at the Library of Congress, the official location of all elements of the St. Clair Tunnel is Port Huron, St. Clair County, Michigan. The Sarnia Pump House is located in Sarnia, Lambton County, Ontario, Canada.

ORIGINAL DRAINAGE SYSTEM AND SUBSEQUENT ALTERATIONS

Surface runoff water from the 14-acre watershed created by the open cut approach to the Sarnia (east) tunnel portal would have quickly flooded the tunnel had no provision been made to pump it away from the tunnel entrance. The water collected in a pair of drains that ran parallel to the retaining walls that extend 2,069 feet east from the portal. The drains, created by the retaining wall on one side, the ballast wall on the other side, and paving stones serving as the base, measured 1 foot 10 inches high and varied in width from 3 feet 3 inches at the easternmost part of the approach to 2 feet 6 inches at the portal. The drains carried the runoff toward the tunnel entrance, where the water was diverted into a sump or well hole on the north side of the approach. A stone-lined culvert, 2 feet high and 3 feet wide, passed under the tracks and connected the drain on the north side of the tracks to a sump, from which the water moved through a cast iron pipe 6 feet in diameter and 160 feet long to a vertical pumping shaft. The iron-lined pumping shaft was 15 feet 2 inches in diameter and 81 feet 3 inches deep. One pump was at the bottom of this shaft, but the principal pumps were in an engine house that straddled the pumping shaft. The resulting drainage system was distinct from the one built at the Port Huron portal in that the tunnel company located the pumps a considerable distance to the north of the approach and well above the grade level of the approach as well. This was probably because of the larger pumping equipment needed to drain the larger Sarnia watershed, combined with the unstable ground encountered in building the Sarnia approach. The original system of drains, culverts, and pumping shaft remains largely intact.[1]

A large L-shaped brick engine housing sitting atop the north embankment of the approach measured 50 feet by 131 feet 7 inches and housed a wide range of machinery and equipment. This included four steam boilers; a pair of small steam engines which drove a pair of Ball dynamos providing electricity for lighting; a 30-horsepower steam engine which drove a pair of Roots blowers providing ventilation; and the pumping equipment used to remove water produced in the Sarnia approach to the tunnel.

The primary pumping equipment was a Worthington vertical direct-acting compound steam pumping engine or deep-well pump. The pump had two pair of cylinders, the high-pressure cylinders having a 19 1/4-inch bore and a 24-inch stroke, while the low-pressure cylinders had a 33 3/8-inch bore and a 24-inch stroke. This pumping engine sat over the vertical pumping shaft and drew water from a depth of 81 feet 3 inches. It had a capacity of 5,000,000 gallons per day or roughly 3,500 gallons per minute. A smaller duplex pump with a capacity of 500 gallons per minute stood at the bottom of the shaft. The tunnel company operated the larger pump only during heavy and prolonged periods of rain. None of this original installation has survived.[2]

The Scientific American article on the tunnel drainage system published in December 1891, showed no pump house at the base of the open cut. Sometime between June 1892 and June 1893, the tunnel company built a brick pump house east of the Sarnia portal on the north side of the tracks. In a report issued in July 1892, the tunnel company directors revealed that the tunnel had recently flooded because of "a rain storm of exceptional severity," forcing a complete closing. They assured the shareholders that they were taking steps to increase the pumping capacity at the Sarnia approach. They must have moved quickly, for a photograph dated June 1893 shows a brick pump house. Engineering drawings from late 1907 for the present Sarnia pump house show the location of walls from an earlier building. The Canadian Westinghouse Company's report on the electrification of the tunnel and pumping system also described the existing equipment at the Sarnia portal as including three 17 inch X 14 inch X 15 inch Worthington duplex steam pumps.[3]

When the Grand Trunk electrified the tunnel in 1908, the railroad built a new pump house on the site of the earlier structure. The new equipment consisted of two 14-inch Worthington centrifugal pumps, each with a capacity of 5,500 gallons per minute, driven by a pair of 200 horsepower, 3,000 volt, 25 cycle, two-phase AC motors. In the 1920s, the tunnel company replaced these with new pumps driven by an 8-cylinder gasoline marine engine made by the Sterling Engine Company of Buffalo, New York. The engine, develops 300 horsepower @ 1,550 RPM.[4]

DESCRIPTION OF THE PUMP HOUSE

This is a one-story rectangular brick building measuring 20 feet 2 inches wide and 32 feet 6 inches long, with walls 13 inches thick. The bricks measure 8 1/2 inches long X 3 3/8 inches high X 4 inches deep, and are laid in the American bond pattern, i.e, six or seven courses made up entirely of stretchers, followed by a single header course. Below both gable ends of the building and along the north facade, the architect employed corbelling, using three courses of brick. The architect apparently did this primarily for decorative purposes, as it serves no major structural function. The building has a moderately-pitched gabled roof supported by a timber king post roof truss. The roof support structure has 2 inch X 8 inch collar-beams, while the posts, struts, and rafters are all made of 2 inch X 6 inch beams. Concrete coping is employed at the top of the walls at the gable ends of the building, to keep moisture away from the brick walls.

Fenestration includes four windows on the north facade and one on the west facade, all measuring 3 feet wide and 3 feet 6 inches high, with 9 panes of glass. Two windows on the south facade measure 3 feet wide and 5 feet 6 inches high, double-hung, with a total of twelve panes of glass. These have 13-inch wide arched concrete lintels and rectangular concrete sills. The east facade has a round opening 2 feet 6 inches in diameter, encircled by an 8-inch wide arch ring consisting of 2 header courses of brick, centered below the east gable. The opening holds a louvered ventilator. The east facade also has a set of double folding doors, measuring 8 feet wide and 7 feet high, with a removable fanlight measuring 2 feet high and 8 feet wide.

NOTES

[1]Engineering drawing, "St. Clair Tunnel--Portal," Front Elevation and Plan, undated drawing, showing the portal as built. Drawing is from the offices of the Canadian National Railways Engineering Department in Toronto.

[2]Engineering drawing, "St. Clair Tunnel - Arrangement of Machinery - Engine House - Sarnia - (Actual Arrangement)," Drawing No. 234, Joseph Hobson, Chief Engineer, Hamilton, Ontario, 21 May 1891 and "The St. Clair Tunnel Drainage System," Scientific American, Vol. 65, 12 December 1891, p. 373. The engineering drawing came from the offices of the Canadian National Railways Engineering Department in Toronto.

[3]Ralph Greenhill, "The St. Clair Tunnel," in Dianne Newell and Ralph Greenhill, editors, Survivals: Aspects of Industrial Archeology in Ontario (Erin, Ontario: The Boston Mills Press, 1989), pp. 202-203; "St. Clair Tunnel Company, Report of the Directors to the Shareholders For the Year Ended June 30, 1892," Grand Trunk Railroad Collection, Bluewater Michigan Chapter, National Railway Historical Society, Box 149: Engineering drawing, "Grand Trunk Railway - New Pump House at Sarnia," Montreal, 6 November 1907; Engineering drawing, "Sarnia - Proposed Pump House," Montreal, 18 December 1907; and Canadian Westinghouse Company, Ltd., The Substitution of Electric For Steam Operation in the St. Clair Tunnel (December 1904), p. 16. Engineering drawings are from the office of the Canadian National Railways Engineering Department in Toronto.

[4]Canadian Westinghouse Company, Ltd., The Substitution of Electric For Steam Operation in the St. Clair Tunnel (December 191904), p. 16.

SOURCES OF INFORMATION

A. Architectural Drawings: The Canadian National Railway Engineering Department, 277 Front Street West, Toronto, Ontario, M5V 2X7, has an extensive collection of drawings covering all aspects of tunnel construction and operating equipment. This is a safe repository and the drawings are likely to be preserved in a permanent archives once the historic tunnel is closed.

B. Historic Views: Several major sources of historic views were identified. The Museum of Arts and History, 115 Sixth Street, Port Huron, Michigan 48060, has about two dozen historic views. The Holland-Paisley Collection of Historical Photographs, 151 Vidal Street North, Sarnia, Ontario, has a similar number. The Canadian National Railway's archives has additional views. Many historic views are held by private collectors and are not readily accessible to researchers.

C. Bibliography

1. Primary and Unpublished Sources:

Grand Trunk Western Railroad Collection held by the Bluewater Michigan Chapter of the National Railway Historical Society, P.O. Box 296, Royal Oak, MI 48068. Materials relating to the St. Clair Tunnel include property maps, reports of the directors of the St. Clair Tunnel Company, statements of construction expenses, and a voluminous correspondence between Thomas E. Hillman, first assistant engineer for the tunnel project, and Joseph Hobson, the chief engineer.

Klohn Leonoff, Ltd., compilers. Historic Tunnel Documents From National Archives of Canada and National Library of Canada (Klohn Leonoff, Ltd., Mississauga, Ontario, 1991). The materials include correspondence copied from the Sir Joseph Hickson Papers, MG29 A29, National Archives of Canada.

C. Bibliography (continued):

2. Secondary and Published Sources:

Canadian Westinghouse Company, Ltd. The Substitution of Electric For Steam Operation in the St. Clair Tunnel, Grand Trunk Railway System (Proposal dated December 1904).

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Kenn, John. "The St. Clair River Tunnel." Inland Seas, Vol. 31, Fall 1975, pp. 175-185.

La Moille, T. G. "The St. Clair River Tunnel." Harper's Weekly, Vol. 35, February 28, 1891, pp. 158-159.

Newell, Dianne and Ralph Greenhill, editors, Survivals: Aspects of Industrial Archeology in Ontario (Erin, Ontario: The Boston Mills Press, 1989).

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"The St. Clair River Railway Tunnel." Port Huron Daily Times--International Tunnel Opening Edition, Vol. 20, No. 155, Part 2, September 19, 1891.

"The St. Clair Tunnel Drainage System." Scientific American, Vol. 65, December 12, 1891, p. 373.

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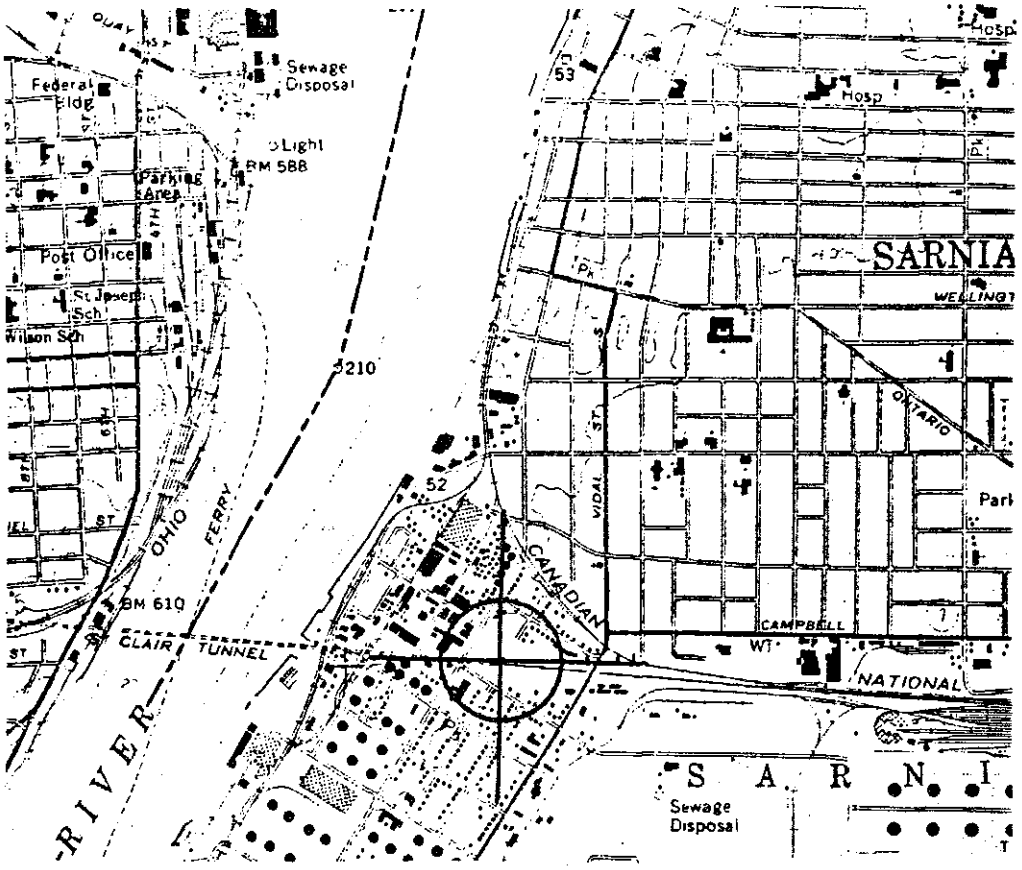
PORT HURON, MICHIGAN QUADRANGLE
UTM: 17.384900.4756940



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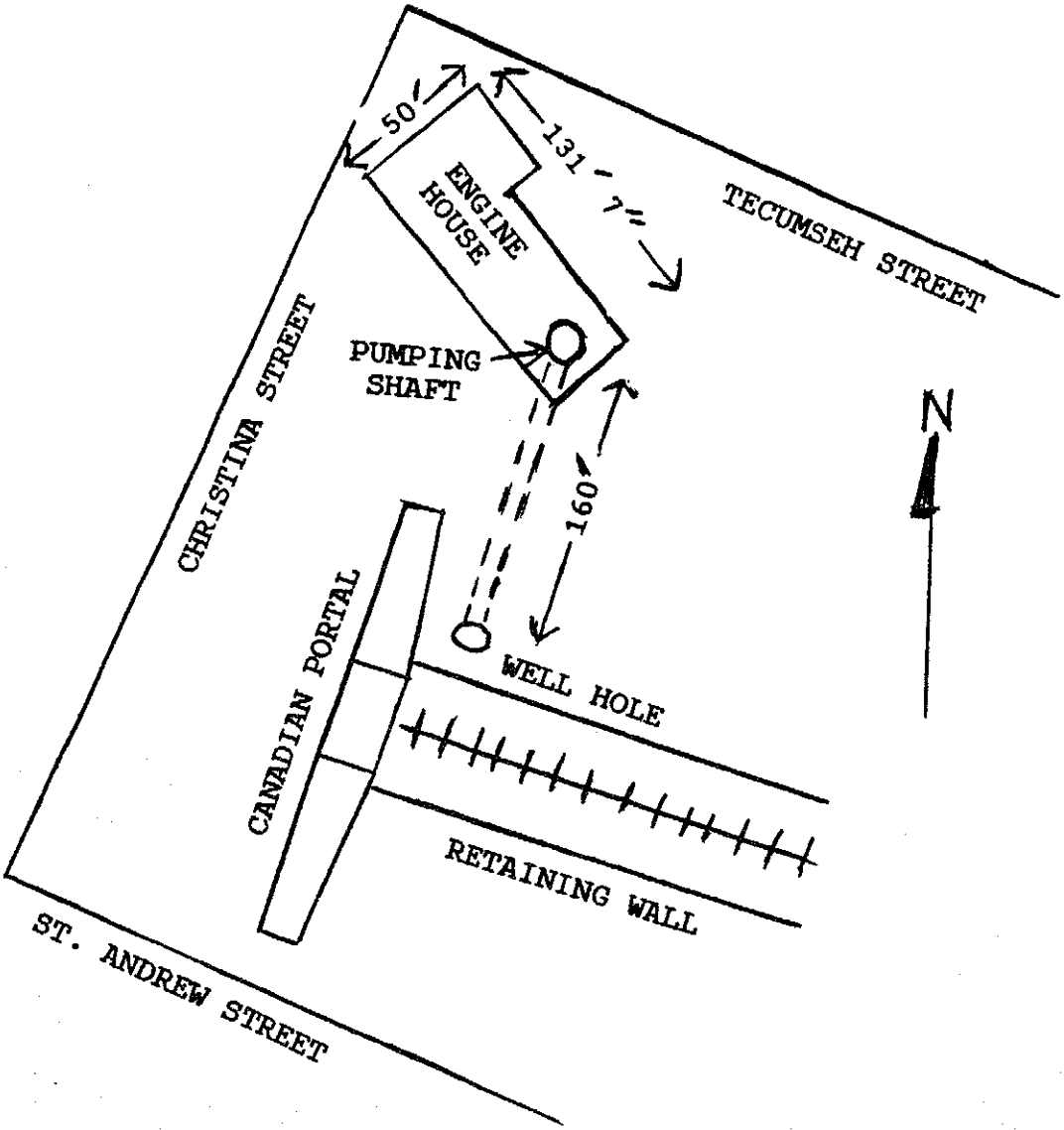
SITE PLAN, 1891



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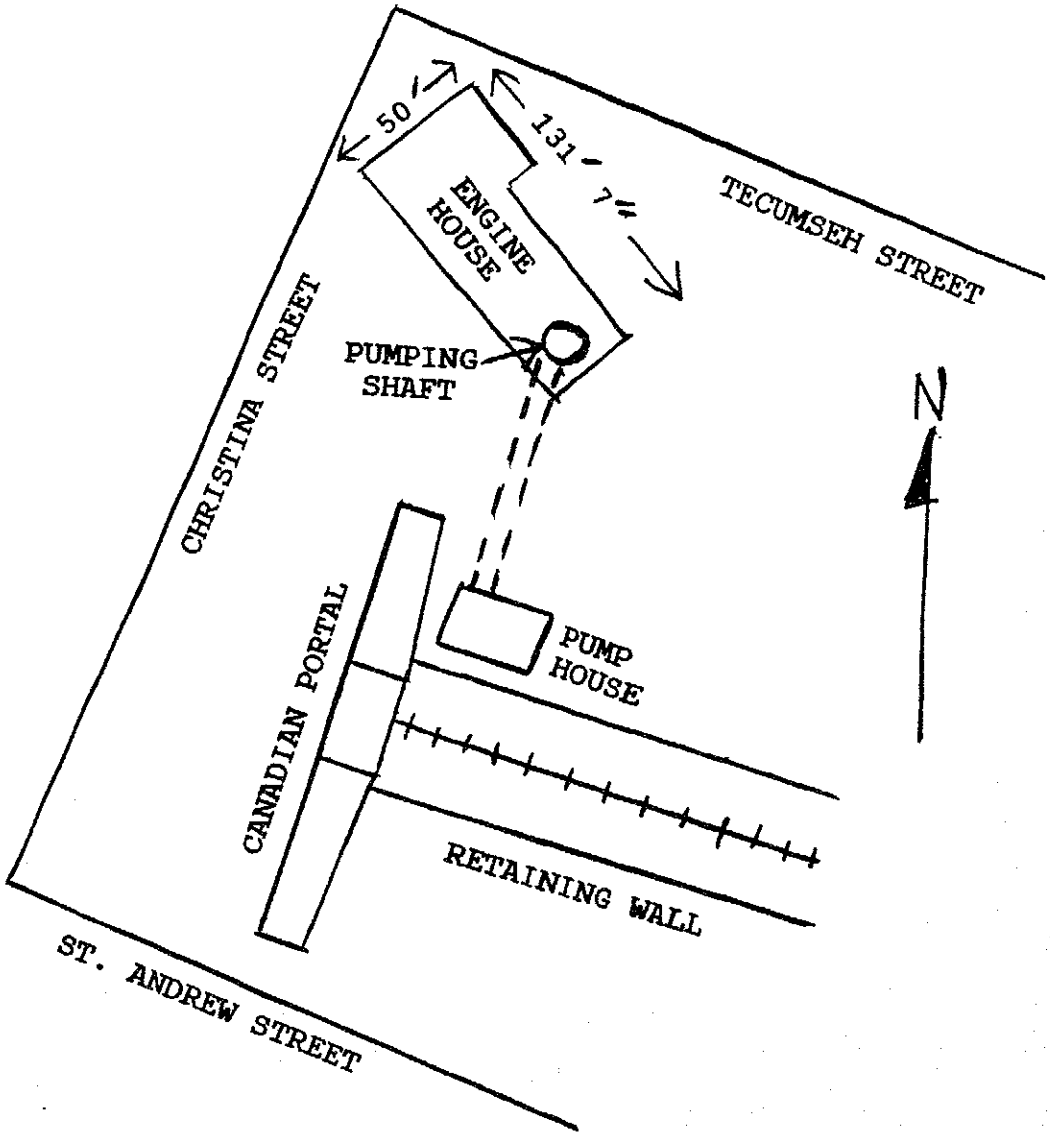
SITE PLAN, 1893



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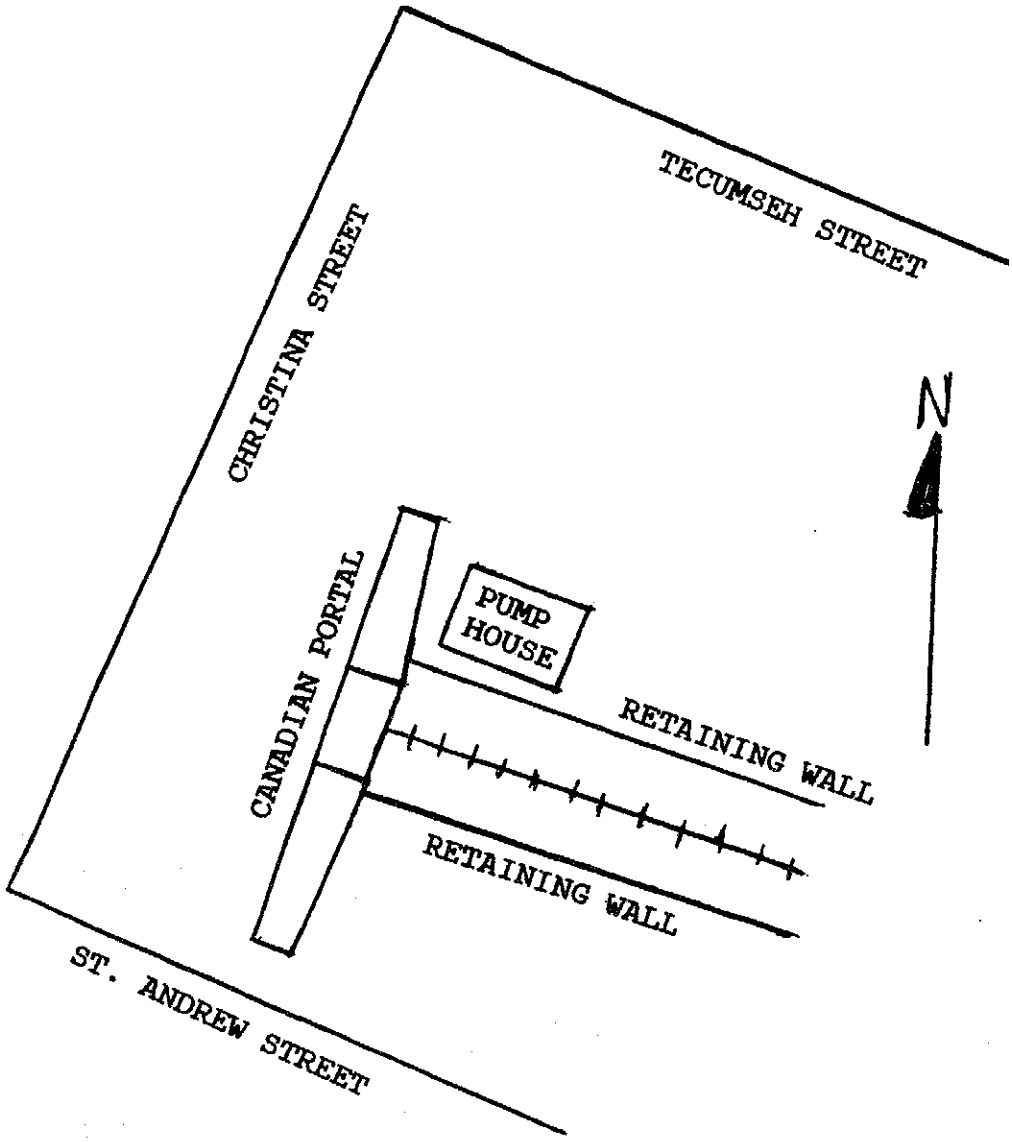
SITE PLAN, ca. 1910 - 1993



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1993 FLOOR PLAN